

**WASHINGTON STATE
DEPARTMENT OF LABOR AND INDUSTRIES
PROPOSED INDOOR AIR QUALITY REGULATIONS
IN OFFICE WORK ENVIRONMENTS**

**Chapter 296-62 WAC
General Occupational Health Standards**

**COMMENTS PERTAINING TO
THE ADOPTION OF NEW CHAPTER 296-62 (WAC)**

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DISCUSSION DRAFT OUTLINE

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QUALIFICATIONS

I am President of Theodor D. Sterling and Associates Ltd., an energy and environmental consulting firm specializing in building-related issues. TDSA Ltd. and its predecessor, Theodor D. Sterling Ltd. have provided Indoor Air Quality Consulting services to the business community, labor organizations, the building industry, and various levels of government in both Washington State and the Province of British Columbia since 1973 (see attached list of clients).

Our most recent project, the Jack Davis Building, a 200,000 sq. ft. provincial government office building in Victoria, British Columbia, for which I was the Indoor Environmental Consultant, was the 1993 British Columbia Hydro Power Smart Design Excellence Award winner. The air quality design features were noted as factors contributing to this award. As a result of research and consulting, I have published over 100 scientific and technical articles on indoor air quality and building technology. I am the Editor of the Proceedings of two recent international conferences on building technology and the environment, "Building Design Technology & Occupant Well-Being in Temperature Climates", held in Brussels, Belgium (February 17 - 19, 1993) and "Control of Ozone-Depleting Substances: Delivering the Montreal Protocol", held at Whistler, British Columbia (September 22 - 24, 1993).

In addition, I am a member of professional societies and code organizations involved with Indoor Air Quality and Building Technology, including the American Society of Heating, Refrigerating and Air Conditioning Engineers Inc. (ASHRAE), the Air and Waste Management Association (AWMA), the American Society for Testing Materials (ASTM), the Building Owners and Managers Association (BOMA), the Building Officials and Code Administrators International (BOCA), the International Conference of Building

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Officials (ICBO), the Canadian General Standards Board (CGSB), the Canadian Hospital Engineering Society (CHES), the American Institute of Architects (AIA), the Architectural Institute of British Columbia (AIBC), Royal Architectural Institute of Canada (RAIC).

I am chairman of a number of ASHRAE committees and was a member of the committee that wrote ASHRAE Standard 62-1989, "Ventilation for Acceptable Indoor Air Quality". I am Vice Chairman of the AWMA committee on "Indoor Air Quality" and I am past chairman of the CGSB committee on Indoor Air Quality.

GENERAL COMMENTS

I commend the proposed new legislation in that the focus is properly on a Building Systems approach to providing acceptable indoor air quality in the office work environment. The design, commissioning, operation and maintenance of buildings and building HVAC systems are the primary factors that impact the quality of the indoor air and resulting occupant health and comfort. Whether or not legislation specific to the office workplace is required is another matter. OSHA provides exposure limits to protect worker health. These exposure levels pertain to all workers, be they white collar or blue collar. Indoor air quality complaints from office workers are generally not health threatening. They are a result of discomfort. The discomfort is a result of unpleasant environmental conditions that include illumination, noise and temperature, in addition to air quality.

The building industry, engineering and architectural professional societies and building codes and standards associations have all responded to the developing need to improve comfort in the office environment. The Building Industry through BOMA and

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with support from both the U.S. EPA and NIOSH, has developed a procedure for responding to occupant comfort complaints and improving IAQ in the office work environment using a building systems approach. This procedure is presented in a joint U.S. EPA/NIOSH publication, "Building Air Quality: A Guideline for Building Owners and Facilities Managers". In addition, courses have been offered on this procedure throughout North America by BOMA.

The HVAC industry has responded to the IAQ issue with a series of revised ASHRAE ventilation, thermal control, building commissioning and energy management standards, all published since 1989.

The architecture profession has responded to the IAQ issue through a series of teleconferences and publications offered as continuing education to architects throughout the U.S.

Building codes have responded by upgrading ventilation air requirements in all model codes, including BOCA, ICBO and the Southern Building Code. Washington State subscribes to both BOCA and ICBO.

Since regulations are already in place protecting the well-being of workers, and the building industry has responded to the need to improve occupant comfort through standards, guidelines, codes and education, it is my opinion that legislation of the type proposed is not required. Further, the proposed legislation appears to overlap the jurisdiction of state and local building codes. However, the authors of this proposed legislation have worked very diligently to prepare a workable program. It may provide a useful template as a guideline document. I realize that due to various pressures, legislation - although unnecessary - may be unavoidable. For this reason I have

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unnecessary be unavoidable. For this reason I have provided the following specific recommendations regarding the content and wording of the proposed regulation.

WAC [REDACTED] - Scope and Application

Many IAQ complaints are a result of tenant improvements or fit ups in new buildings as opposed to remodeling of existing buildings. Often parts of these new buildings are occupied while others are under construction. Wording should be added to this section to include new partially occupied buildings.

WAC [REDACTED] - Definitions

Define: Acceptable Indoor Air Quality

Ventilation

Controlled Air Ventilation

Health Symptoms

WAC [REDACTED] - HVAC System Documentation

Heating and cooling equipment in buildings without an integrated mechanical ventilation system component (e.g. an office with only a window or wall-mounted air conditioning unit or heater) are exempted from points (3) and (4).

This stand-alone equipment is the very type that is often poorly maintained. Stand-alone equipment should not be exempted from inspection, maintenance and reporting requirements.

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Stand-alone humidification equipment is commonly used in the office environment to maintain comfort conditions for occupants and to maintain ideal conditions for electronic equipment. Inspections, maintenance and reporting should be required for all types of stand-alone humidification equipment.

WAC 173-17 - Operation and Maintenance of HVAC Systems

- (2) • The requirement that the HVAC system be operated as specified by the applicable ventilation codes in effect at the time the permit covering the building's HVAC system was issued must be clarified. For example, many buildings constructed in the 1970's are serviced by HVAC systems designed to meet energy codes which are in conflict with existing ventilation codes.
- In the case of partial renovations, would the building code in effect at the time of original construction or the code in effect at the time of the renovation apply?
 - Provide an appendix that explains acceptable methods of calculating the outdoor air ventilation rate from actual measurements and from design criteria and engineering data.
- (3) It is unclear what this point regarding maximum occupancy loads actually requires. The "to the extent they have control" caveat appears to negate the purpose of this point and, in fact weakens the entire document. Also, assuming there is some means of control, is it the responsibility of the owner or of the employer to undertake and pay for alterations to the HVAC systems.

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- (5) The requirement for general or local ventilation in this point should specify outside air ventilation. Within this point there should also be a requirement that outside air provided for individuals performing office work outside of normal

WAC - Controls for Specific Air Contaminant Sources

- (1) • Recent studies have demonstrated that it is not necessary to exhaust smoking break rooms directly outside in order to avoid recirculation to non-smoking areas. Hayward et al (1993), Light and Gay (1993) and Collett et al (1993) have shown that maintaining smoking break rooms at negative pressure in relation to adjacent non-smoking areas prevents smoke migration. Considering the practical limitations in many sealed buildings of providing exhaust directly outside and in light of recent studies demonstrating the effectiveness of negative pressurization, I recommend deleting the last sentence of this point.
- As an alternative to separate smoking break rooms, the ventilation rates recommended in Table 2 of ASHRAE Standard 62-1989 are intended to provide acceptable indoor air quality including a moderate amount of smoking throughout the office workplace. Provided that the HVAC system has been designed to and is operated in accordance with ASHRAE's Standard 62-1989 there may be no need to segregate smokers from non-smokers.
- (2) • What is the difference between "adverse health symptoms" and "illness"? I suggest changing the wording to "health symptoms and discomfort". This suggestion pertains to all further sections where similar wording occurs.

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- In most cases outside air contaminant sources will be located off rather than on the property. This point should include all adjacent sources. Also, some direction should be provided to the owner and employer on appropriate ventilation practices when the ambient outside air does not comply with EPA clean air standards.
- This point should include criteria to minimize potential for infiltration of microbial contaminants from cooling towers.

- (6) [REDACTED] control requirements for cooling towers, as well as unvented space
[REDACTED] other combustion appliances.

**WAC [REDACTED] 1 • Evaluation and Control of Health Symptoms and Illnesses
Related to Indoor Air Quality**

The scope of this section should be broadened to include discomfort.

1(d) Is the owner or the employer responsible for paying for the IAQ investigation?

1(d) (iii) How many occupants must be interviewed and how are they selected?

(2) • Who is responsible to pay for follow-up inspections required to resolve problems?

- The wording in this point is not exactly in agreement with ASHRAE Standard 62-1989. The ASHRAE CO₂ recommended maximum level is 1,000 ppm.

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WAC [REDACTED] 3 - Indoor Air Quality During Remodeling of Occupied Offices

- This section should apply to new buildings that are undergoing tenant fit-up and are being occupied while fit-up is occurring.
- (4) Clarify the definition of an affected area and add a requirement to notify other employers within the building.
- (5) The exemption for remodeling projects adjacent to unoccupied floor space should [REDACTED] adjacency should include space immediately above or below, as well as [REDACTED] by the same HVAC zone.

**WAC [REDACTED] 7 - Appendix A: Carbon Dioxide Measurement:
Non-Mandatory**

- There are many limitations associated with using CO₂ to calculate outdoor air ventilation rates and as a surrogate for ventilation. These limitations should be recognized in the text.
- Faulty combustion appliances will result in increased CO and NO_x levels, not CO₂.
- The limitation of detection tubes for measuring CO₂ should be included.

**[REDACTED]: Smoking Cessation Program Information:
Non-Mandatory**

This section does not add substance to the regulations. Information on smoking cessation programs is readily available for individuals seeking such advice.

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